



THE UNITED STATES PATENT AND TRADEMARK OFFICE  
Re: Appeal to the Board of Appeals

Write Application of: RATH, Hans-Peter

Serial No 09/701,587

Group Art Unit: 1713

Filed: November 30, 2000

Examiner: Lu

For: PREPARATION OF HIGHLY REACTIVE POLYISOBUTENES

Date: August 9, 2004

To: Hon. Commissioner of Patents and Trademarks

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1. ☐ NOTICE OF APPEAL: Applicant hereby appeals to the Board of Appeals from the decision dated \_\_\_\_\_ of the Primary Examiner finally rejecting claims \_
2. ☐ A check to cover the extension fee of \$ \_\_\_\_\_ is enclosed.
3. ☒ BRIEF on appeal in this application is transmitted herewith.
4. ☐ An Oral Hearing is requested.  
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Respectfully submitted,  
KEIL & WEINKAUF

By Daniel Kim  
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re the application of ) **MAIL STOP APPEAL BRIEF**  
RATH, Hans-Peter )  
Serial No. 09/701,587 ) Group Art Unit: 1713  
Filed: November 30, 2000 ) Examiner: Lu  
For: PREPARATION OF HIGHLY REACTIVE POLYISOBUTENES

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Honorable Comm'r. of Patents  
PO Box 1450  
Alexandria, VA 22313-1450

BRIEF ON APPEAL

Sir:

This appeal is from the examiner's final office action dated January 23, 2004.

REAL PARTY IN INTEREST

The real party in interest is BASF Aktiengesellschaft, of Ludwigshafen, Germany.

Reel/Frame 011426/0027, recorded on November 3, 2000.

RELATED APPEALS AND INTERFERENCES

To appellants' knowledge and belief, there are no interferences or other appeals  
which will directly affect or be directly affected by or have a bearing on the Board's  
decision in this application.

### STATUS OF THE CLAIMS

Claims 1-10 currently are pending in the application. Claim 11 has been withdrawn from consideration by the examiner.

### STATUS OF THE AMENDMENTS

The claims have not been amended subsequent to the final office action of January 23, 2004.

### SUMMARY OF THE INVENTION

The present invention relates to a process for preparing highly reactive polyisobutenes having a terminal vinylidene group content of more than 80 mol% and an average molecular weight of from 500 to 5000 dalton by cationic polymerization of isobutene in the liquid phase in the presence of boron trifluoride complexes at from +40 °C to -60 °C.

### ISSUES

The issue is whether claims 1-9 are obvious under 35 USC § 103(a) over Rath (US 5,408,018).

### GROUPING OF CLAIMS

The claims have not been argued separately.

### ARGUMENT

The following legal authorities are relied on in the following arguments in the order in which they are cited:

*In re Jones*, 958 F.2d 347, 21 USPQ2d 1941, 1944 (Fed. Cir. 1992);

*W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983).

### REJECTION

Claims 1-9 are rejected under 35 USC § 103(a) as being unpatentable over Rath (US 5,408,018). The examiner stated that although Rath teaches that a tertiary alkyl group containing ether is preferred, Rath does not exclude the dialkyl ether which does not contain a tertiary alkyl group and therefore, it would have been obvious to a skilled artisan at the time the invention was made to employ Rath's teaching to prepare a trifluoride/secondary alcohol/dialkyl ether complex wherein the alkyl of the ether is secondary alkyl such as 2-butyl and isopropyl because such is taught in the reference and symmetric ether is cheaper to prepare and in the absence of any showing criticality and unexpected results.

Applicant does not believe the examiner has established a *prima facie* case of obviousness because in order to complete the PTO's *prima facie* case and shift the burden of going forward to applicant, there must be evidence (other than speculation by PTO) that one of ordinary skill in the subject art would have been motivated to make the modifications of the prior art necessary to arrive at the claimed subject matter. *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941, 1944 (Fed. Cir. 1992). The examiner has not presented such evidence.

The polymerization mechanism requires protons or carbocations to be delivered from the complexing system which works best with sterically hindered molecules. In the

present invention which is directed to the polymerization of isobutene, the best known system comprises tertiary ethers (i.e. tertiary butyl ether) and secondary alcohols (i.e., isopropanol). Ethers other than tertiary ethers also form complexes with boron trifluoride. However, they alone are not capable of inducing isobutene polymerization. Also, primary alcohols alone are not as reactive as required. Applicant surprisingly found that the combination of bis-secondary alcohols with primary alcohols works well even though each component taken alone are not reactive or not reactive enough for preparing high reactive polyisobutenes.

In view of the above, applicant believes the examiner has engaged in prohibited hindsight to arrive at the present invention by not properly considering the state of the art. To imbue one of ordinary skill in the art with knowledge of the invention in suit, when no prior art reference or references of record convey or suggest that knowledge, is to fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983).

#### CONCLUSION

For the foregoing reasons, it is respectfully submitted that reversal of the examiner's rejection of all claims is in order.

**A check in the amount of \$330.00 is enclosed.**

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any excess fees to such deposit account.

Respectfully submitted,

KEIL & WEINKAUF

A handwritten signature in black ink, appearing to read "Daniel Kim", written in a cursive style.

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## **APPENDIX**

1. A process for preparing highly reactive polyisobutenes having a terminal vinylidene group content of more than 80 mol% and an average molecular weight of from 500 to 5000 dalton by cationic polymerization of isobutene in the liquid phase in the presence of a complex comprising boron trifluoride at from +40° to -60°C, which comprises polymerizing in the presence of a complex comprising boron trifluoride and
  - a) a primary alcohol having 1-20 carbon atoms or a secondary alcohol having 3-20 carbon atoms, or a mixture of these alcohols, and
  - b) an ether containing no tertiary alkyl groups and having the formula I



where R<sup>1</sup> and R<sup>2</sup> are primary or secondary alkyl groups having 3-10 carbon atoms, with the proviso that at least one of R<sup>1</sup> and R<sup>2</sup> is a secondary alkyl group.

2. A process as claimed in claim 1, wherein the secondary alcohol a) used is isopropyl alcohol and/or 2-butanol.
3. A process as claimed in claim 1, wherein the ether b) used is diisopropyl ether, di-sec-butyl ether and/or isopropyl sec-butyl-ether.

4. A process as claimed in claim 1, wherein the primary and/or secondary alcohol a) and the ether b) are used in a molar ratio of from 0.01:1 to 10:1.
5. A process as claimed in claim 1, wherein the primary and/or secondary alcohol a) and the ether b) are used in a molar ratio of from 0.02:1 to 2:1.
6. A process as claimed in claim 1, wherein boron trifluoride, primary and/or secondary alcohol and ether are combined in the polymerization reactor to generate the complex in situ in the polymerization mixture.
7. A process as claimed in claim 1, wherein the boron trifluoride/ether complex is preformulated and is introduced, together with the primary and/or secondary alcohol or separately, into the solvent or monomer feed to the reactor or directly into the reactor.
8. A process as claimed in claim 1, wherein polyisobutenes having a terminal vinylidene group content of more than 90 mol% are polymerized at an isobutene conversion of up to 95% using a preformed boron trifluoride/isopropanol/diisopropyl ether complex, a molar secondary alcohol/ether ratio of from 2:1 to 1:5 and a boron trifluoride/diisopropyl ether ratio



of from 0.6:1 to 0.9:1.

9. A process as claimed in claim 1, wherein the isobutene source is a C<sub>4</sub> cut comprising isobutene in an amount of at least 6% by weight.
10. A polyisobutene having an average molecular weight of from 500 to 5000 dalton and a terminal vinylidene group content of more than 90%, obtainable by cationic polymerization of isobutene in the liquid phase with the aid of boron trifluoride as catalyst at from 40 to -60°C in the presence of a boron trifluoride complex with
  - a) a primary alcohol having 1-20 carbon atoms or a secondary alcohol having 3-20 carbon atoms, or a mixture of these alcohols, and
  - b) an ether containing no tertiary alkyl groups and having the formula I



where R<sup>1</sup> and R<sup>2</sup> are primary or secondary alkyl groups having 3-10 carbon atoms, with the proviso that at least one of the radicals R<sup>1</sup> and R<sup>2</sup> is a secondary alkyl group.

11. A process for preparing highly reactive polyisobutenes having a terminal vinylidene group content of more than 80 mol% and an average molecular

weight of from 500 to 5000 dalton of a complex comprising boron trifluoride at from +40°C to 60°C, which comprises polymerizing in the presence of a complex comprising boron trifluoride and

- a) a primary alcohol having 1-20 carbon atoms or a secondary alcohol having 3-20 carbon atoms, or a mixture of these alcohols, and
- b) an ether containing no tertiary alkyl groups and having the formula I



where  $\text{R}^1$  and  $\text{R}^2$  are primary or secondary alkyl groups having 3-10 carbon atoms, with the proviso that at least one of  $\text{R}^1$  and  $\text{R}^2$  is a secondary alkyl group, or  $\text{R}^2$  is methyl or ethyl.